Operation.—A sound was passed down as far as the stricture, an incision made upon it, and its point reached deep in the perineum. No traces of the urethra beyond could be discovered by the most careful manipulation. He was, therefore, allowed to recover partially from the effects of the ether, and to make an effort to void his urine. An incision was now made in the direction of the neck of the bladder, and a female catheter introduced as a guide, which was replaced by a No. 8 elastic catheter. The parts were very vascular, and the steps of the operation, which lasted over an hour, much obscured by blood.

Not the slightest unfavourable symptom followed; but at the end of the week, when it was necessary to replace the catheter, it was found to be a matter of much difficulty to do so, the end of the instrument escaping into the rectum. This was, however, finally effected both at that time, and afterwards, by hooking the beak of the instrument against the pubes, and then, instead of trying to force it forwards, the handle was suddenly depressed, and it slipped into the bladder. Carried forwards in the ordinary way, it always went into the rectum.

On the 27th, it was recorded that all the urine was discharged by the catheter, although there was purulent discharge through the fistulous opening near the rectum, and occasionally from the rectum itself. The patient remained in the hospital rather more than two months, when he left, and has since been seen well.

ART. IV.—*On Fever and Inflammation.* By J. L. TEED, M. D., of Mendota, Ill.

NEXT to the various processes of healthy nutrition, fever and inflammation present the greatest interest both to the physiologist and pathologist—they enter singly or conjoined, into nearly every condition of disease; primarily or by their results, they lay by far the larger portion of civilized humanity in its grave; they meet us at every turn, and present themselves under nearly every phase: it is no wonder, therefore, that from the earliest days they have engrossed, and still continue to engross so much of the attention of physicians.

Yet these processes are even still mysteries. After all that has been said and written about them, and the innumerable disputations, how little has been reduced to the certainty of science, and what a vast portion of our fancied knowledge still remains hypothesis or conjecture!

Whence the cause? Partly the very difficulty of the subject, and its intimate connection with the processes of life, themselves so little comprehended; and partly because physicians, while yet ignorant of the natural workings of the healthy body, having observed a few more superficial facts of its diseased conditions, have immediately framed hypotheses by which to explain them; when each observer meeting some variances in the facts, and finding some discrepancies in the hypothetical explanations of the others, has thought it necessary to rebuild the whole fabric from the foundation; thus hypothesis has been piled on hypothesis, until the student in sheer bewilderment sides with one or with another, without knowing exactly why, and then declares his party the true faith, and brands all others as heterodox or heretic.

These conditions have many things common to both, as well as peculiar to each. Their very names exhibit one of their connecting circumstances—increased heat; in inflammation this is local, in fever general; the part *inflammat*, the whole *fervet;* they arise also from a common cause, therefore they are seldom met with separately, for inflammation is scarcely ever present without fever, and fever, unless periodic or febricula, is seldom observed free from all inflammation; and indeed several pathologists have declared fever to be an inflammation, some of one organ, some of another. Either one, however, may be the primary or the secondary disease. They differ principally in that inflammation is essentially a local disturbance, while fever is a general derangement—inflammation, while consisting of a nervous as well as a vascular element, is yet more particularly seated in the organic tissue itself, starting from which as a centre, it may implicate the whole frame—so as to have been declared a perverted nutrition; while fever has no local habitation, no fixed point of departure, but from the very commencement seems to be a general disorder of the whole organic functions. In inflammation the peculiar product is an excess of fibrin, in addition to the varied results arising from the affection of different organs; in fever the tendency is to a diminution of the fibrin and of the red corpuscles, the results of a general derangement of the secreting functions being added.

Pathologists have endeavoured to condense these processes into that *multum in parvo* a definition; but from their complex nature, this attempt has been generally a failure. Galen described fever as *calor præter naturam*, and Virchow writes, "fever consists essentially in elevation of temperature, which must arise from increased consumption of tissue, and appears to have its immediate cause in alterations of the nervous system." Copland had previously written, "that the morbid impression (producing fever) is first made upon the organic or ganglial nervous system, and owing to the circumstances of this system actuating the circulating, secreting, and excreting viscera, is manifested in an especial manner by the changes observed in the state of vascular action, in the animal temperature, in the functions of secretion and excretion, in the circulating fluids, and in the other functions which are more or less intimately dependent upon the ganglial system." Virchow adds, "Every disease may become febrile, every disturbance may form itself into a fever if it extend itself to the centres which regulate the waste of the tissues, and the proper moderating power of the tissue metamorphosis is suspended."

Dr. Southwood Smith observes, "that the order in which the morbid actions, which constitute fever, occur, is first, derangement in the nervous and sensorial functions, this is the invariable antecedent; secondly, derangement in the circulating function; this is the invariable sequent; and thirdly, derangement in the secreting and excreting functions; this is the last result in the succession of morbid changes. Derangement in the functions of secretion and excretion never comes first in the series; derangement in the nervous and sensorial functions never comes last in the series; derangement in the function of circulation never comes either first or last in the series, but always the second in succession."

Inflammation has been defined as increased sensibility and vascularity of a part, with a tendency to morbid secretion, and consequent disorganization. Dr. Bennett defines it as an exudation of the normal liquor sanguinis, and Dr. Alison as a *tendency* to exudation.

In the number of this journal for July, 1860, I traced the histological arrangement of two of the tissues, the muscular and the osseous, as typical of the whole, to be that of cells in various approximations having one surface in connection with a nutrient vessel of the plasmatic vascular system; both vessel and cell being filled with distinct fluids, which pass from one to the other according to their osmotic conditions; and this interchange of fluids constitutes nutrition. If, therefore, liquor sanguinis osmoses from the vessel it must be into the cell, for the wall of a cell forms a part of the limiting membrane of the vessel. One of two things may happen, the fluid may osmose too largely *into* the cells, causing over-distension of them; or it may remain in the vessels and distend *them;* and in addition to either of these, it may rupture the walls of some vessels and cells, and blend the whole into one confused mass: either of these states, except the first, can be caused only by some sudden impediment to the circulation in vessels nearer the heart, as may arise from sudden contraction of the vessels at the seat of the disorder. Should the engorgement come on gradually, a larger amount of plasma may circulate through the part, and exude largely, or osmose into the cells, but becoming organized, hypertrophy will be the result, or some other structural change, and yet be unattended by inflammation. So also an impediment may gradually arise to the circulation in a part, causing obstruction in, and osmosis from the plasmatic vessels, distending the cells, or perhaps even rupturing some vessel and cell-walls without it becoming organized, and yet be unattended by inflammation, as in some dropsical conditions. It seems to be only that local condition, which is attended by an increased formation of fibrin in the fluids, a loss of the contractile power of its smallest vessels with dilation and engorgement, and an irritated state of its contained nerves which should be considered as inflammation.

The nerve, the vessel, the ultimate tissue element, and the fluids in the part are all unitedly concerned in the production of inflammation, nor can it exist without the implication of them all; no two even of those factors can produce it.

This same histological arrangement, being applied to the term waste of tissue, naturally raises the question, what is the tissue which suffers this increased consumption in fever? If we examine closely the phenomena of nutrition, it can be only the albuminous pabulum of the blood, the similar portions of the cell fluids, the blood-corpuscles, and the adipose deposits in the body, for we have no evidence that the cells, whether muscular, nervous, osseous, or other, are broken up and carried away, but the contrary, unless the forming of fresh Haversian systems in bone be considered such a removal of cells, although it may admit of other explanations. If this increased consumption were a result of a natural or healthy cause, it might be replaced by an increase in the food, as happens in increased exertion, &c. &c.; in fever the increased consumption is accompanied by a diminution of the appetite, and with impairment of the assimilating functions. But *while there is an increased consumption, there is no increase in the amount* of fibrin contained in the blood, unless some local inflammation be conjoined with it.

We may thus see the important differences between these two processes arising from their elementary composition, and extending through all their relations, treatment, &c. &c. Increased heat is a symptom of both diseases, but its production, as much as that of fibrin, remains an unsettled question; it is chiefly the result of chemical decompositions and oxidations; while the friction of the blood against the vessels may assist in its formation, as also may nervous currents, as is the case with ordinary electricity—however any increase in the quantity of blood circulating through a part will elevate its temperature, and an acceleration of the general circulation is more frequently attended with the same result, if not invariably so—the local increase in the circulation attends always in inflammation, the general as constantly in fever—and to moderate this activity of the circulating system has been a constant desideratum in the treatment of these diseases, whether by venesection, arterial compression, digitalis, the revived veratrum viride, or indirectly by promoting the evacuations. Inflammation as well as fever may arise from causes originating with the body, as well as from those affecting it from without—while particular causes and particular differences in the individual will occasion corresponding differences in the fever or inflammation produced, and thus may arise sporadic cases of those fevers generally contracted by contagion or infection; for in such diseases the *first* case must have originated *suâ sponte;* but in all accelerated circulation and increased heat are constant factors.

Starting from the acknowledged basis, that fever is the result of an effect produced on the nervous system, two methods of treatment have been promulgated; the first is to act directly on the nervous system, and restore its equilibrium; the second is to remove the effete productions until the cause has ceased to operate, or the incited action has expended itself—the first, attempts to cut the fever short; the second, denies this possibility—in the first secernents, in the second, stimulants are used as adjuvants; of course the main stay of the treatment being the reverse. And notwithstanding the intrinsic differences between them, the same theory and plan of treatment have been adopted by either party in regard to inflammation.

There are many objections to the general use of the means with which we are at present acquainted, that exert a powerful influence on the nervous system; they do not act on all alike, and they are not always controllable in their action—instance the different effects of morphia, strychnia, digitalis, prussic acid, &c., on different individuals.

The second plan limits the formation of effete matter, counteracts its influence while it remains in the system and constantly promotes its removal.

The first method is exemplified in the cure of periodic fever, where a powerful stimulant taken shortly before the accession of a paroxysm, puts a complete stop to the disease. The second plan, indeed, from its very character of expectancy, cannot present such a striking example, but by comparing the general results of the two modes of practice in continued fevers and inflammations, they are greatly in favour of the second.

This free use of stimulants is based on the theory that disease arises always from deficiency of nervous force, either direct or indirect; it ignores the fact so strongly, and so continually dwelt on by Copland, that vital manifestations, or the results of the vital forces, may be vitiated in kind as well as in degree; it looks only at the force acting, instead of also considering the matter acted upon; and forgets that with increased tissue change, is an increased amount of effete products, which by their very presence vitiating the blood stream, produce an unhealthy condition of parts previously unaffected, while the very stimulants poured in increasing the products of decomposition, the nervous centres are reacted upon from their peripheries, organs already overworked, or unable to work from congestion receive fresh excitation, and additional local and general disorder are awakened, under which the disease and the patient are terminated together.

One argument raised in favour of alcoholic stimulants in continued fevers and inflammations, is their alleged power of reducing the action of the heart. But the action of the heart is subject to great variations in these diseases spontaneously, it will vary on different days, and even on different parts of the same day: it is, however, difficult to conceive how a stimulant, which as its ordinary results causes acceleration of the heart's action, and increased fulness in the pulse, will reduce the action of the heart while the pulse remains full, and it is not until the pulse has become *soft* as well as *frequent*, as in the latter stages of continued fever and inflammation, that the use of alcoholic stimulants has been found most serviceable.

The blood plasma circulating around every cell in the body, as well as being the vehicle of nutrient matter to them, is also the channel by which effete matter is removed from them. In a state of health this nutrient matter is derived from a due manufacture of alimentary substances into the albuminous pabulum of the liquor sanguinis; while the effete matter is removed by the secreting and excreting organs. Paralysis of the organic nerves supplying these glandular structures, is followed by a cessation, or at least by a diminution of their secreting function. The blood stream may pass through them in increased quantity, but the secretion is hindered, and its peculiar constituents retained in the blood. Should this be the case with only one organ, then by the principle of compensation, other organs act vicariously; when, however, the disturbance becomes general, and the secretions of all are hindered, the trouble is increased in such a degree, that life is soon terminated unless they are restored—under the second plan of treatment mentioned above, the object is, from the earliest stages, to promote the action of those organs by which effete matter is expelled, and by abstinence or low diet reduce their work as much as possible. The excreta being capable of division into two classes, the nitrogenous, and the non-nitrogenous, and the chief of the former being urea and uric acid, those remedies which have the most effect in promoting their secretion are of especial value in the treatment of both diseases, especially in their earlier stages, and liquor ammoniæ acetatis, and bicarbonate of potash, or its citrate, have descended to us as heir-looms of great value, although from the researches of Dr. Garrod, lithia and its carbonate appear to possess superior powers to them.

The non-nitrogenous excreta are derived largely from the intestinal canal; but owing to the great tendency to diarrhœa in many of these disorders, and the consequent debility thereby induced, and owing to the fact that the small quantity of food allowable may require longer time than ordinary for its digestion and assimilation, great care must be always observed in the use of purgatives, of which enemata may be in a great majority of instances the better kind; while it is essential that they act, it is also essential that they do not act too much. In both fever and inflammation the action of the skin may be advantageously promoted. Tepid sponging with alkaline solutions, or with diluted alcohol, will be found very effectual, and contribute much to the ease and comfort of the patient. The pulvis antimonialis comp. of the Pharmacopœia, or James' powder as usually called, is by far the best diaphoretic for general use, and when combined with small doses, one-sixth or one-eighth of a grain of acetate of morphia, a little camphor, and nitrate potash when allowable, will often lull a febrile paroxysm after a few repetitions, and induce a copious diaphoresis; a calm and quiet sleep; a moist tongue, and a general improvement with a gentle increase of all the secretions.

Another remedy much used in both these diseases, and in nearly all their stages and kinds, is mercury in one or other of its forms, and no remedy has been so abused by a reckless use, so much so as to have become a byword and a reproach to the profession. It is usually given in what are termed alterative doses. This term alterative is exceedingly vague; it means everything or nothing, and justifies the saying of Chateaubriand "that words were invented to conceal our thoughts," and our ignorance, it may well be added. An alterative is a remedy which changes the character of the secretions without increasing or diminishing them. But we neither see this effect produced, nor do we expect to see it in the use of mercury in either fever or inflammation. If quicksilver or any of its preparations is digested with solution of chloride of sodium, decomposition ensues, chloride of mercury, *i. e.*, corrosive sublimate is formed, and soda from oxidation of the sodium by atmospheric oxygen, and this process is facilitated by the addition of a little blood; chloride of mercury is soluble in excess of albumen; and the double compounds, chloride of mercury and albumen, with chloride of sodium or with chloride of potassium, present considerable resistance against decomposition by oxygen. The mercury, therefore, passing into the various cells from the blood stream in these double compounds, as it were, withdraws a large amount of the blood on the one side, and of the tissues on the other, from the action of oxygen as effectually as venesection, while the volume of the blood not being altered, the action of the heart is lessened, having to circulate that amount of unstimulating matter; and the blood itself is at the same time just so much diluted, absorbs so much less oxygen, and is consequently so much less stimulating. There is no necessity in the majority of cases to cause as much mercury to be absorbed as the system will tolerate without disturbance; for it is not until this point is reached that the particular local effects of salivation are produced, and its remedial effects are obtained previously; its approach may be easily recognized, except where the system is very impatient of this mineral; and when we wish to rid the system of it, a rapidly oxidizing agent, as the chlorate of potash, causes its decomposition and discharge.

During the formative stage, or the stage of incubation, any zymosis spreads rapidly through the whole system; while all the excretions being checked, the opportunities for its discharge are more and more lessened; in the inflammatory stage the nitrogenous excreta are increased, and remain above their natural standard as long as this stage lasts, while the chlorides are as constantly diminished, the patient discharging a large excess of nitrogen, over and above that consumed in his food; the carbon and hydrogen excreted not being so easily estimated, but they manifest greatly disordered conditions as evinced by the fetor of the breath, of the stools, and of the sweat. In this stage the circulation becomes accelerated, and the pulse full and bounding, in proportion to the sthenic character of the disease. The connection between this condition of the pulse and the intensity of the disease is so obvious, and the remedy so instantaneous, that bloodletting has been the practice from time immemorial; and in incipient inflammations of a sthenic type under the diminished blood stream, the pulse will often become soft and compressible, all the secretions will begin to flow, and the patient pass directly into the stage of convalescence. It is only when the case has been of long standing, or the cause of a specific character, or the disease too closely approximating the asthenic or typhoid condition from the first, or too apt to run into it, that bloodletting is inadmissible; but in all inflammations where the vascular element is more involved than the nervous bloodletting—while in the opposite, that is, where the nervous is more involved than the vascular—counter-irritation should be resorted to, and often with considerable freedom. In inflammation of a distant joint, arterial compression in the limb above has been often followed by good effects, the diminution of the blood stream being in this case confined to the part affected.

These diseases form an excellent confirmation of the correctnesss of Liebig's division of food into plastic and respiratory. We observe, and more particularly so in fever, how largely the nitrogenous portions of the body are removed, as evinced by the large excess of nitrogen discharged over and above that contained in the food; and also by the great amount of caloric set free in the system from the secondary decompositions thereby occasioned; while the large quantity of cold water, and often of ice, consumed is but barely sufficient to render the internal heat bearable. The food in these cases is always extremely scanty, for nature has wisely abolished the desire for it, and weak, thin broths, or whey, are generally preferred, and drinks acidulated by some vegetable acid. The carbo-hydrates and fats, more especially the latter, are extremely ill-suited to this condition of things, and if taken are very apt to produce intestinal disturbances. It has been lately objected to Liebig's view, that fat, salts, and water are as essentially components of the tissues as albumen. This objection is very superficial, for all nitrogenous food contains both fat and salt, and the animal substance void of them, gelatin and its allied substances are not, although rich in nitrogen, capable of being substituted for them. It is not nitrogen that makes *plastic food*, that is not Liebig's point; but that food to be plastic must contain nitrogen. This by no means denies that a body may contain nitrogen, and yet be unfit for food; it only affirms, what no one has yet proved to be false, that animal life cannot be supported on non-nitrogenous food; but may be supported solely on single articles of food, as milk, flesh, bread, and that these articles, besides other things, are very rich in nitrogen; and not only are fever and inflammation in their relations to food, good examples of the truth of Liebig's views, but the more fully these views are understood and carried out by the physician in the treatment of these diseases, and of the periods of convalescence from them, the better will it be for his patients, and the less likely will they be to suffer relapses.

In examining fever or inflammation under general principles, great care should be taken not to select peculiar forms of fever or inflammations of particular organs as types of these diseases in general, by which to guide our treatment of them as a class. No two forms of fever, and inflammations of no two organs, are to be treated on any stereotyped plan; and it may almost be added, no two cases of either disease. Peculiarities of the individual, and of the circumstances are almost infinite, and will cause variations of treatment correspondingly numerous—and the laying down rules for the use of stimulants, or purgatives, or any other remedy, or the disuse of bloodletting as a constant practice in inflammation generally from a special practice, in inflammation of a particular organ, or in fever, from a particular epidemic, will tend rather to reduce the practice of medicine to a shallow empiricism, than to extend its rational and scientific foundations, and plant the minds of its students and practitioners on those vito-chemical principles which deal with the body as a material reality, and its changes as real material changes; and when these are unknown will lead them, not to invent hypotheses, but to institute investigations to obtain the facts. The present state of physiology has been attained chiefly on the foundation of animal chemistry; for although the microscope has revealed the minute structure, we have not been able to gain thereby a definite idea of the function of the part; but by learning more and more fully the chemical characters of each secretion, and by carrying the investigation into the laboratory, we have obtained information which has yielded valuable results. The same plan in pathological physiology will add greatly to them, and when observers shall take the vito-chemical stand-point, medicine will progress as a science and as an art.

ART. V.—*On the Action of Potash, Soda, Lithia, Lead, Opium, and Colchicum on the Urine.* By WILLIAM MOSS, M. D., of Philadelphia.

THE following experiments were made with the design of determining the influence of the above-mentioned substances over the quantity of the urine, and the amount of its solid, organic, and inorganic constituents, with especial reference to the amount of urea and uric acid. They were all performed upon myself during the winter months of 1860–61.

My age is 27 years; height 5 feet 5½ inches; weight 125 pounds; health good. I regret that it was impossible for me to regulate accurately the quantity and proportions of my food, and the amount of exercise, further than to make them, in a general way, as uniform as possible.[1] This disadvantage necessarily attends experiments extending over several months, and is common to most of the previous experimenters on this subject. The quantity of urine was determined in cubic centimetres, and the weight of

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[1] I take two meals daily: breakfasting, *à la fourchette*, at 9 A. M., drinking at this meal strong black tea; and dining at 5 P. M.